March 23rd – 25th 2004

Systems Engineering Net Centric Services

Interoperability and Systems Integration Conference

Denver, Colorado

Christine Reynolds
Vice President , C3I Systems
Defense Mission Systems Division

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DISCUSSION POINTS

- **OIF/OEF proved shared situational awareness was necessary to achieve Interoperability in wartime**
  - **Many successes, but proved need for more**
- **Net-Centric Warfare can enhance situational awareness**
- **Single DoD infrastructure can ensure interoperability**
- **What is NG doing?**
- **What are implications for DoD and Industry?**

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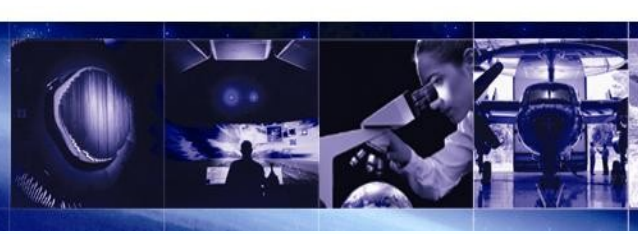
SHARED SITUATIONAL AWARENESS – WHAT IS IT?

COP (COMMON OPERATIONAL PICTURE)

- Decision makers look at the same situational display in different geographical locations and see the same picture
  - Targets have the same ID number
  - Tracks are the same
- Fosters collaboration
- Enhances decision making
- Accelerates the 'speed of command'

Same Picture In differen Places



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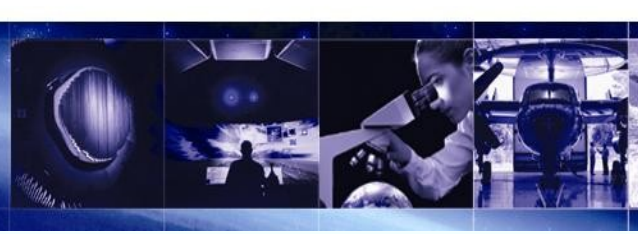
SHARED SITUATIONAL AWARENESS – WHAT ARE IMPLICATIONS?

- **Communication between all nodes is in place**
  - **Can transmit and receive data and use it properly**
- **Must operate off of common data base**
  - **Syntax/semantics are the same**
- **Data is processed the same way**
  - **Results of processing are the same**
- **Common visualization of information**
  - **SA Interoperability is having the same information everywhere at the same time**



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COP FACILITATED INTEROPERABILITY IN OEF/OIF SUCCESSFULLY

- **Facilitated Intra-Service, Joint and Coalition partners' Interoperability**
  - **Use of COP Synch Tools enabled all users to have same Situational Awareness at the same time**
    - Fostered Collaboration
    - Improved Decision-making
  - **Sponsors of programs recognized that their systems had to feed data to the COP to be useful**
- **Proved the concept that interoperable COP can improve wartime operations**

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DEFINING THE FUTURE
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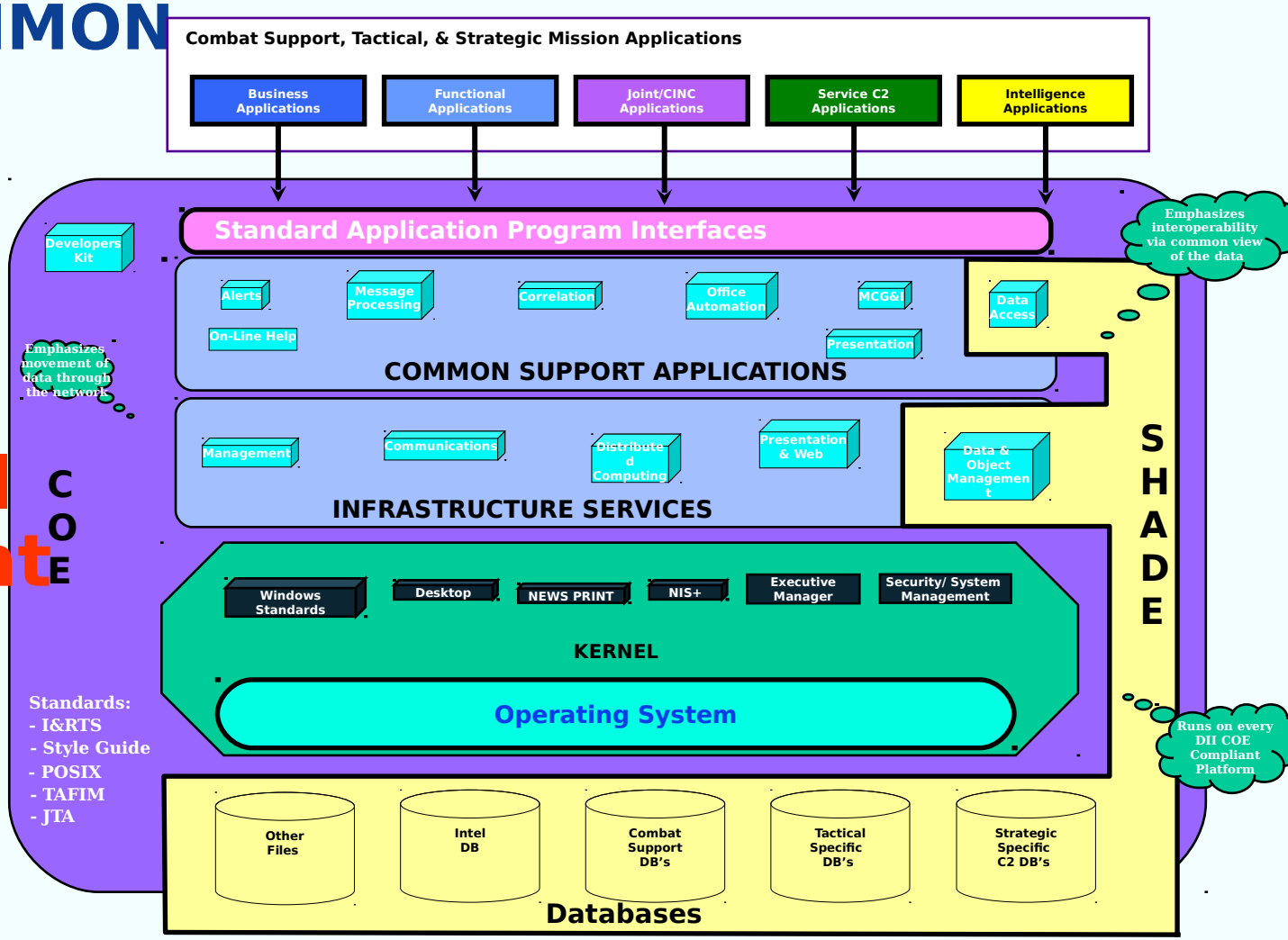
THE COP (COMMON OPERATIONAL PICTURE) NEEDS A COMMON FRAMEWORK

Common Operational Environment



Open software foundation

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COE ENABLED MANY PROGRAMS TO LEVERAGE FRAMEWORK

- AALPS
- ACGS
- AMBISS
- AMDWS
- AMDPCS
- AMPS
- ANGSC-52
- ASAS
- ASD
- ATCS
- ATLAS
- BCTP
- BMC3
- BSM
- CINC CSA
- CNCMS
- CNPS
- CR/HMS
- CSCE
- CSSCS
- CTIS
- B4IJM
- DCARS
- DTSS
- FATDS
- FAAD C2I
- FIRESTORM
- GCCS-A
- GCSS-A
- IBDAS
- IMETS
- ISYSCON
- LW
- MCCCC
- MCS
- MFCS
- PEGEM
- RCAS
- SAS
- TAIS
- TCAIMS
- THAADBMC3I
- TPSOPS
- TSIU
- UAV
- WARSIM

AT-AOC

- FWeather
- AMC BDM
- AMS
- AWACS
- A2IPB
- CSEL
- DCAPES
- IEMATS
- FORTE
- GBS
- GCCS-AF
- GCSS-AF
- IMDS
- IMOM
- ISC2
- MAMS

- AAAV
- AFDI
- ARTDF
- GALE
- GCCS
- GCCS-I3
- GCSS
- IAS
- JCACTD
- JCALS
- JDISS
- JDP
- JMCSIDS
- JMPS
- JSCGS
- JTAT
- JTT
- JWARN
- MAGTF
- MEPED
- MIDB
- TCO
- TNP
- JMNS

- AADC
- ATWCS
- CADRT
- COMDAC
- CCS
- CUB
- CV/TSC
- GCCS-M
- IUSS
- JMPS
- KSQ-1
- LAMPS
- MEDAL
- METOC
- MPA
- MPAS
- MSBL
- NAVSSI
- NFCS
- NSPF
- NSS
- NSSN
- PTW
- REDS
- SFMPL
- SH60 MPS
- SRMT
- TACLOGS
- TACMobile
- TAU
- TEAMS
- TERPES
- TCAC
- TCS
- TDSS
- TES/NFN
- TESS
- TWCS

$6B Program Funding

$30M Annual COE Funding

JHOC

- Deepwater
- GCCS-CG
- OSC
- SARTools
- SCCS
- VMS
- VTS

JCOE

- Australia
- Canada
- Denmark
- France
- GCC
- Germany
- Italy
- Japan
- NATO
- UK

FIOP

DJC2

JC2

- GCCS
- GCSS
- I3
- JMPS

JOINT **USA** **USAF** **USMC** **USN** **USCG**

- SRATCOP
- TBMCS

COE

Open Software

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DEFINING THE FUTURE

CCS (COP) Footprint – From the NCA to the Foxhole

Homer, AK
Seward, AK
Ketchikan, AK
Auke Bay, AK
Petersburg, AK
Coos Bay, OR
Honolulu, HI
Hilo, HI
Guan
San Diego, CA
Monterey, CA

Yongsan
FORSCOM
ASOC
AFMC
TRANSCOM,
AMC &
JTO
STRATCOM
SPACECOM
SOUTHCOM
CENTCOM

OM &

ıcies

PACOM
ARPAC
PACAF
PACFLT
MARFORPAC
AREUR
USAFE

Woodshole, MA
South Portland, ME
Mayport, FL
Key West, FL
Highlands, NJ
Portsmouth, VA
San Juan, PR

Miami Beach, FL
Atlantic Beach, NC
Mobile, AL
Roosevelt Roads, PR
Cape Canaveral, FL
Goucester, MA
Portland, ME
Tybee Island, GA

NAVEUR
EUCOM

- COMICEDEFOR
- CNE London
- Naval War College
- NAVFAC
- NAVORDCEN
- NAVSPACECOM
- USACOM
- CINCLANTFLT

CSS
318 MCCIS Seats
16 Nations
Every NATO Maritime HQ
STANAVFORLANT
STANAVFORMED

- SOCACOM
- COMPHIBGRU 2
- NAVAIRLANT
- COMUSFORAZ
- COMUSNAVCENT
- COMLOGWESTPAC
- USFJ
- CTF-72
- CTF-76

ACOM, ACC
LANTFLT
MARFORLANT
ARCENT
CENTAF Remote Sites
CINCS to Components
US Army- - 200+ sites
US Navy- - ashore/afloat

Corpus Christi, TX
RAF Mildenhall
RAF Lakenheath
Spangdahlem AB
Sembach AB
Aviano AB
IncirlikAB
Southwest Asia / Thailand

- CTF-74
- CNFJ
- Flagships
- CV/CVN
- LHD
- LHA
- LPH
- Surface Combatants
- Subsurface Combatants

Canada
Norway
Italy
Japan
Australia

Eielson AFB
Elmendorf AFB
Misawa AB
Yokota AB
Kadena AB
Osan AB
Kunsan AB
Andersen AFB
140+ Units

- CS Locations
- 0 Joint & Coalition Workstations

* Key Locations for Iraqi Freedom

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COP MUST DO MORE

- **Not all data is in the COP**
  - **TBMCS and GCCS-J must both be in AOC to see the whole picture even though significant overlap of functionality**
  - **Army leadership needed an FBCB2/BFT in CFLCC in addition to GCCS-J for situational awareness**
- **Requirements have changed**
  - **COP was developed for C2 situational awareness**
  - **Now COP must support Time Critical Targeting and other tasks**
  - **Needs more and more timely data which NCW will provide**

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OPERATIONAL ENVIRONMENT WITH NCW

NCW will provide more data, much faster

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OEF/OIF HAS FOCUSED NEED FOR COP IMPROVEMENTS

- **Must have all the relevant data available on single screen**
- **Must have much more-timely data**
  - **More sensor coverage, better managed**
  - **Need for better comms, better managed**
- **Infrastructure must accommodate real-time data**
- **Need for a tailorable UDOP (User Defined Operational Picture):**
  - Tactical, operational, strategic
  - Blue vs Red forces
  - Air, ground, marine, etc.

One Infrastructure, satisfying multiple requirements

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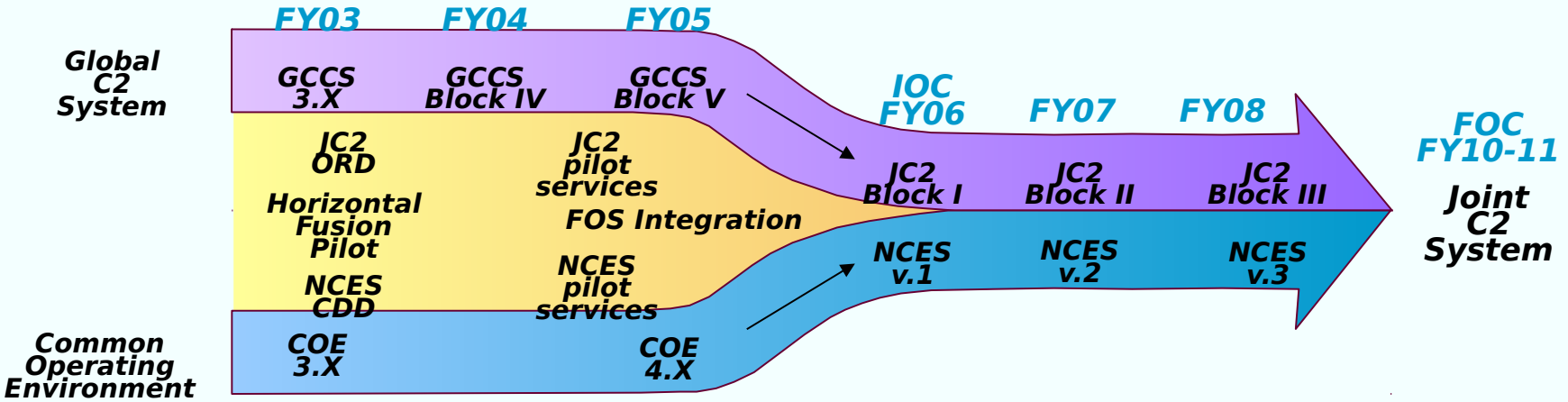
WHAT IS DOD DOING?

- **OSD/JFCOM Objectives**
  - **All systems will be interoperable by 2008**
  - **DoD will have single C2 system: JC2**
- **Budgets will not be sufficient to recapitalize all C2 systems**
- **What is path forward?**



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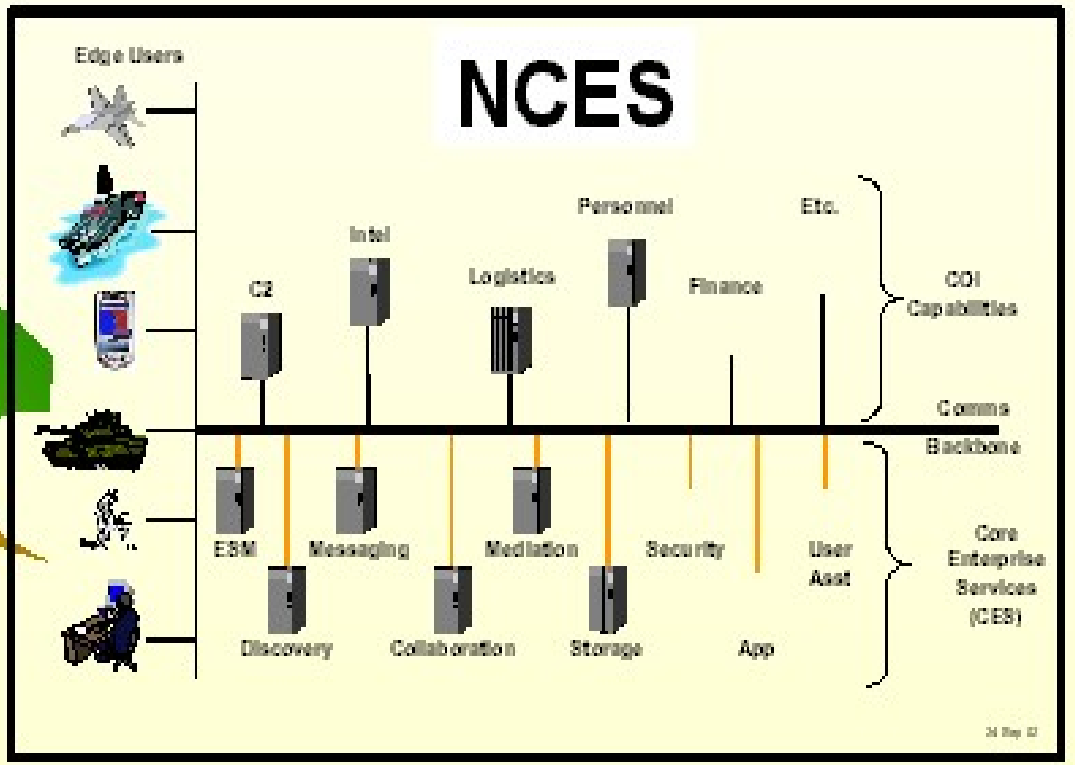
DoD's TRANSFORMATION

- **Built upon a universal IP based environment**
- **Reusable structure using Core Enterprise Services**
- **Will enable interconnectivity**
- **C2 Services will drive interoperability**



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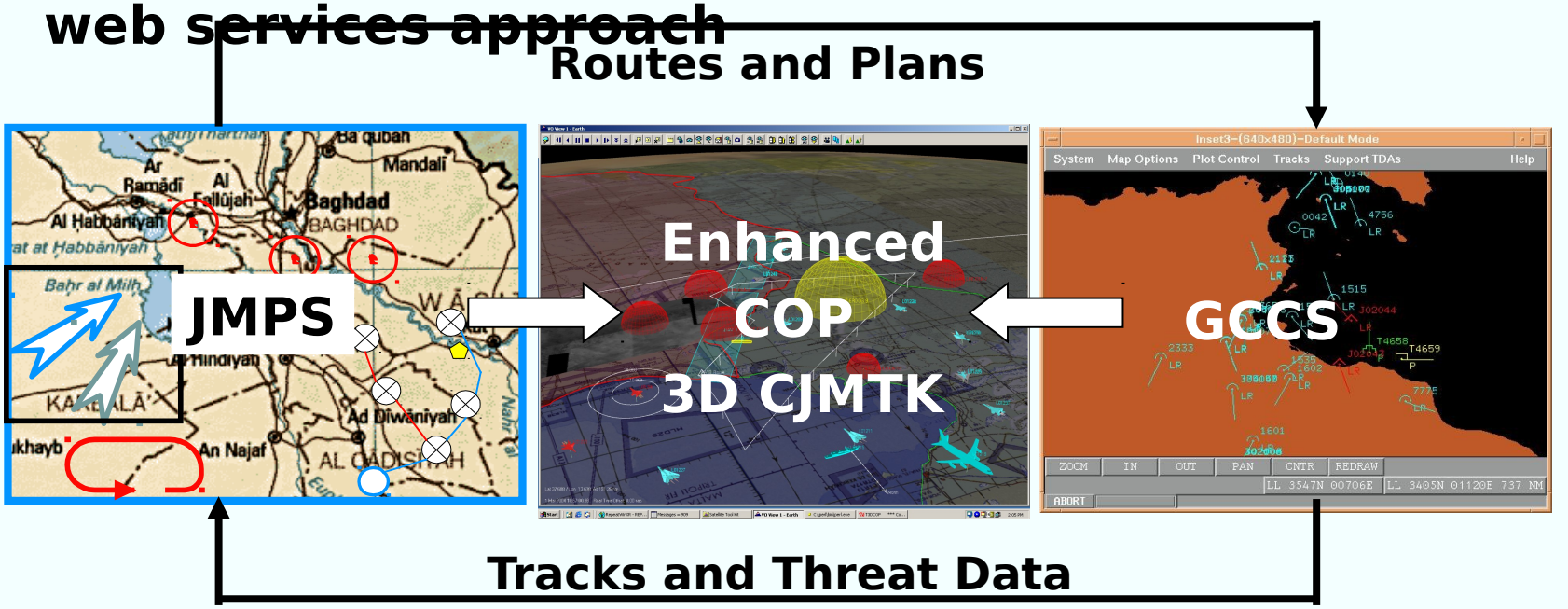
NG ENHANCING COP THROUGH WEB SERVICES

- **Integration of Mission Planning (JMPS) with Command and Control (GCCS) using common web services**
- **Proved that .NET and J2EE can work together using web services approach**



Verifies the Concept of Web Services

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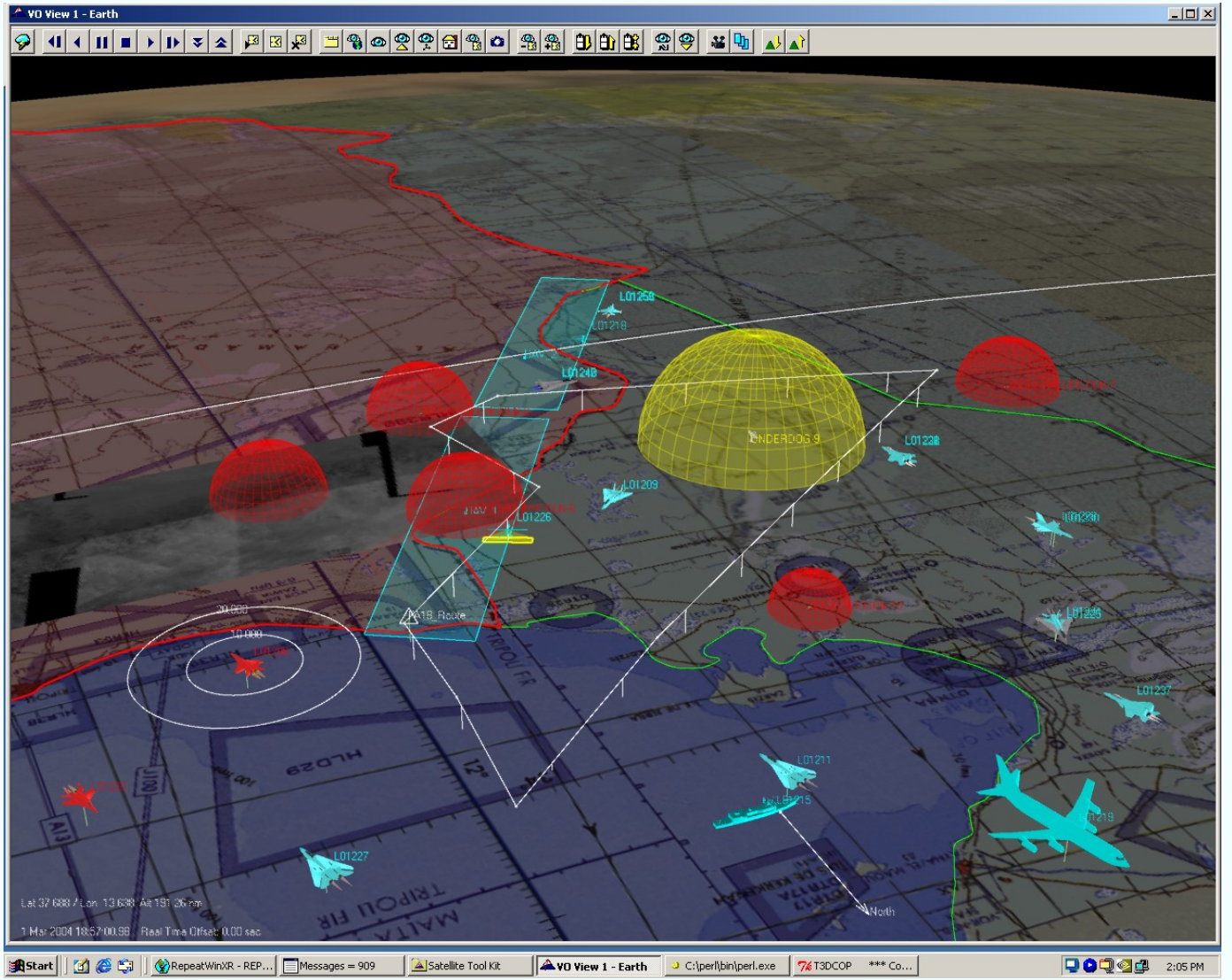
NG's 3D COP

DECISION MAKING WITH ENHANCED SITUATIONAL AWARENESS AND PLANNING DATA



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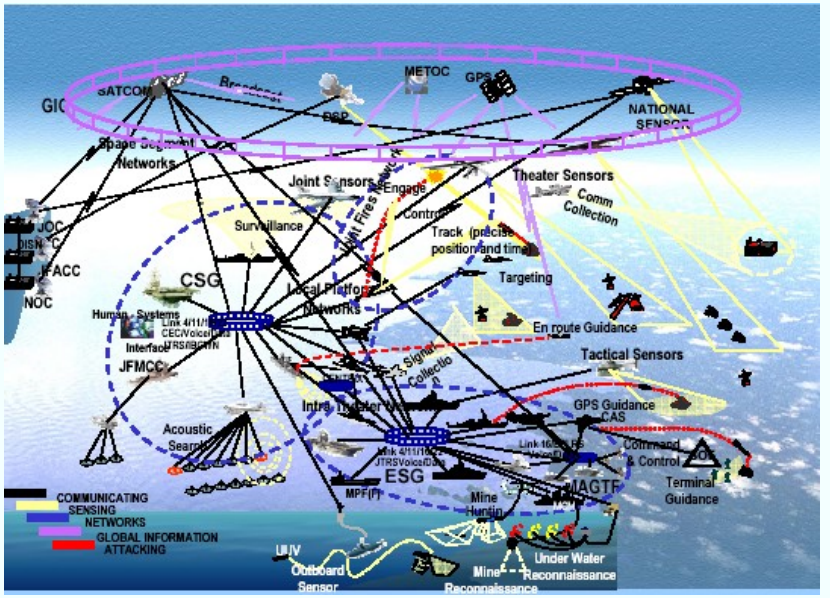
NORTHROP GRUMMAN IRAD/CONTRACTS

- **Creating C2 Services, based on NCES**
  - COTS Based
  - Disparate technologies, distributed geographically
  - Architecturally agnostic
  - Totally open

- **C2 Services 'captured'**
  - Strategic C2 (GCCS)
  - Mission Planning (JMPS)
  - Additional Sensor Data (JSTARS)
  - Time Critical Targeting (TCOM,DMT,
  - JMEM,TWP)
  - Mensuration (Raindrop/Rainstorm)
  - Intell (I3)
  - Tactical C2 (FBCB2/BFT,C2PC)
  - ISR Management (DCGS-N,SRMT)
  - UAV (Global Hawk)
  - Air Threat Defense Planning (JDP)
  - Combat Management System (ICMS)



Pathway to the Future

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IMPLICATIONS FOR DOD

- **Warfighter needs more capability (applications) not redundant infrastructures**
  - **Investment dollars are limited**
  - **Use of DoD frameworks will conserve investment**
  - **'Capability based' must mean protecting training dollars**
- **Standards are necessary to be part of all development and integration**
  - **Many underway: DODAF, NCOW, NCW Industry Consortium, NCES, C2ERA, DIB**
    - Overlaps, confusing
  - **DoD must define, control and manage:**
    - **Standards, frameworks, C2 Services**

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2nd GENERATION DOD INFRASTRUCTURE – NCES

- Many lessons learned
  - Government specified, managed and controlled
    - Industry input
  - Will enforce interoperability
  - Open
    - Published APIs, S/W development tool kits, sufficient documentation and training,
    - Source to be open as well
  - Not based on a proprietary architecture

USG can add capability without going through another company

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IMPLICATIONS FOR INDUSTRY

- **Proprietary approaches are dead**
- **Legacy systems can be harvested and reduce cost of migrating to new DoD architecture**
- **Use of standard DoD architecture is required**
- **Effort going forward will require more systems engineering than development**

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SUMMARY

- **Lessons Learned from OIF and OEF demonstrate:**
  - **Interoperability is essential for wartime operations**
  - **Interoperability attainable through use of common infrastructure**
    - **Affordability dictates this approach**
  - **Need for multiple common pictures, all derived from common infrastructure – *build it once, use it many times***
- **DoD taking steps to address these issues**
  - **NCES will facilitate conversion to service based architecture**
  - **JC2 will provide single, coherent, interoperable C2 system**
  - **Other Systemic investments will address supplying needed information in real time to infrastructure**

Value to the Warfighter

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Acronyms

- **AOC - Air and Space Operations Center**
- **BFT - Blue Force Tracker**
- **C2ERA - Command and Control Enterprise Reference Architecture**
- **C2PC - Command and Control Personal Computer**
- **CFLCC - Coalition Force Land Component Command**
- **DCGS-N - Distributed Common Ground Station-Navy**
- **DMTi - Decision Making Toolkit**
- **DODAF - Department of Defense Architecture Framework**
- **FBCB2 - Force XXI Battle Command Brigade and Below**
- **GCCS - Global Command and Control System**
- **I3 - Integrated Imagery and Intelligence**
- **ICMS - Integrated Combat Management System**
- **J2EE - Java 2 Enterprise Edition**

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Acronyms

- **JC2/NCES - Joint Command & Control/Network Centric Enterprise Services**
- **JMEM - Joint Munitions Manual**
- **JMPS - Joint Mission Planning System**
- **NCOW - Net-Centric Operations and Warfare**
- **NCW - Network Centric Warfare**
- **OIF/OEF - Operation Iraqi Freedom/Operation Enduring Freedom**
- **SA – Situational Awareness**
- **SAPM - Synchronized Air Power Management**
- **SRMT - Surveillance Reconnaissance Maritime Tool**
- **TBMCS - Theater Battle Management Core Systems**
- **TCOM - Time Critical Object Manager**
- **TWP - Target Weapon Pairing**
- **UAV -Unmanned Aerial Vehicle**